

EXHIBIT

E

A. W. LOOKUP CORPORATION

Structural Engineers

500 Fayette Street ▪ Suite 100 ▪ Conshohocken, PA 19428 ▪ 1795 ▪ (610) 825-2600 ▪ www.awlookup.com

October 16, 2013

Mr. Michael S. Soule, Esquire
O'Connor Kimball LLP
Two Penn Center Plaza
Suite 1100
1500 John F. Kennedy Boulevard
Philadelphia, Pennsylvania 19103

Reference: E. Allen Reeves v. Michael Graves & Associates, et al.
O'Connor Kimball File # 991-0147
AWL Project #: 2647

Dear Mr. Soule:

You have asked me to respond to opinions of Mark Coggin, P.E. of Thornton Tomasetti stated in his report of June 8, 2013. This report will focus on the following issues raised by Mr. Coggin:

- Coggin's claim that there was information missing from David Chou & Associates' ("Chou's") structural design drawings that purportedly prevented Reeves' fabricators from completing shop drawings, increased RFIs and delayed the Project.
- Coggin's claim that there is no correlation between Reeves' failure to adhere to Project specifications requiring Reeves to retain steel fabricators that used a professional engineer to prepare shop drawings and increased RFIs, additional work for Chou and Project delay.
- New opinions raised by Coggin as to alleged defects in Chou's structural design drawings.

A. Claimed Missing Information from Chou's Structural Design Drawings

Coggin claims that there was information missing from Chou's structural design drawings, specifically beam reactions, load information and dimensions which prevented Reeves' fabricators from detailing the connections and completing the shop drawings.

1. Beam Reactions and Loads

I concur that there were no beam reactions shown on the structural drawings. The lack of beam reactions however would have had no effect whatsoever on a competent detailer's ability to detail and design the connections. Coggin admits in his report that

Mr. Michael S. Soule, Esquire

October 16, 2013

E. Allen Reeves v. Michael Graves & Associates, et al.

O'Connor Kimball File # 991-0147 - AWL Project #: 2647

Page 2

"The general notes on the structural drawing S1.0 indicate that the structural steel connections should be designed to resist one half of the tabulated maximum capacity as shown in tables with the AISC Manual of Steel construction." (Coggin report, page 3.) With this load information, a competent detailer or professional engineer (had one been retained) could easily determine what reaction to use for the connection design.

Coggin implies that two RFIs related to structural steel connections, Nos. 13 and 42 arose at least in part due to missing load information on Chou's structural design drawings. In fact, neither of these RFIs was generated due to missing load information.

Mr. Coggins refers to RFI 13 as a special moment connection problem with missing load information. Coggin goes so far to state that *"Without the required special load information, the connection could not have been designed by a Professional Engineer retained by the fabricator."* I disagree. The *"special moment connection"* referred to by Coggin was nothing more than an existing W12 x 25 beam bearing on masonry at Column Line E.4. No load information was required. No connections or other changes were required. (See Chou's deposition, pages 159-161.)

As to RFI 42, Architectural Steel asked for dimensions of hangers and their connections. It was answered within three business days. No load information was requested.

Finally, I note that the alleged lack of beam reactions and load information was evidently not an issue that in any way affected the detailers' ability to complete their shop drawings. I note that none of the RFIs submitted by Architectural Steel (I am unaware of any RFIs that were submitted by Dobslaw) and/or Reeves requested loads or asked for assistance in determining beam reactions. Had beam reactions or loads been an issue, I would have expected to have seen an RFI. There were none.

2. Missing Dimensions

Coggin makes the broad assertion that the majority of the structural steel RFIs dealt with questions concerning dimensions that should have been included on the structural drawings. Coggin further concludes that had the dimension information been included in the Project drawings, the Project would not have been delayed *"due to dimensional questions"*. (Coggin report, page 13.)

In support of his assertion, Coggin cites only three (3) RFIs: Nos. 38, 43 and 47.

Mr. Michael S. Soule, Esquire

October 16, 2013

E. Allen Reeves v. Michael Graves & Associates, et al.

O'Connor Kimball File # 991-0147 - AWL Project #: 2647

Page 3

- RFI 38 raised architectural dimensional issues locating roof beams of the rotunda and was answered by Graves, not Chou. (See Chou's deposition transcript, pages 164-65.)
- RFI 43 asks for varied information including dimensions, welds and nailer holes at steel lintels. The structural drawings defined bearing length, so all of the dimensions could be established by Reeves using field measurements. Chou provided the welding information, which could also have been provided by a Professional Engineer retained by the fabricator. The nailer holes were already listed on the Architectural Steel sketch and were confirmed by Chou.
- RFI 47 requested architectural dimensions relating to end wall openings. As the requested dimensions were architectural, Graves issued CSK 43 with the requested dimensions the same day.

While I do not disagree that there were some legitimate RFIs from Architectural Steel concerning structural dimensions, they were relatively few in number and were outnumbered by the numerous RFIs posed by Architectural Steel to resolve connection issues which could have been addressed had the fabricators retained a Professional Engineer as specified. (See Masalaitis report April 5, 2013, pages 13, 14.) The few RFIs raising structural dimensional issues were well within the standard of care.

B. Reeves' Failure to Adhere to Project Specifications Requiring Retention of a Professional Engineer to Design Connections.

Coggin disputes the notion that Reeves' failure to retain a Professional Engineer to design the steel connections created more work for Chou and the design team. Coggin's disagreement is based on the claim that Chou noted only minor exceptions to Dobslaw's first submission of shop drawings with "*minimal comments*" and only marked one of the drawings from Dobslaw's first submittal "*Revise and Resubmit*". Coggin further claims that Chou's comments on shop drawings indicate that he was generally satisfied with Dobslaw's production. Coggin's claims are not supported by my review of Dobslaw's first submission of shop drawings.

Based on the first Dobslaw submission stamped as received by Chou on June 1, 2006, I find the following:

- Drawings 70 through 115 related to steel stairs (not structural steel) and were not stamped by Chou. As the steel stairs were not structural steel, there would have been no reason for Chou to have reviewed these drawings.
- Of the fifty-nine (59) structural steel erection and piece shop drawings, three (3) erection drawings did not have a review stamp by Chou¹, three (not one, as Coggin claims) were stamped by Chou "*Revise and Re-Submit*", thirty-nine were "*Exceptions Noted*" and fourteen were "*No Exceptions Taken*."

¹ While these three (3) drawings did not have a review stamp, it is evident from the notations that Chou made on these drawings that he did review them. I can only assume that the lack of a review stamp was a clerical error.

Mr. Michael S. Soule, Esquire

October 16, 2013

E. Allen Reeves v. Michael Graves & Associates, et al.

O'Connor Kimball File # 991-0147 - AWL Project #: 2647

Page 4

- From my review of the thirty-nine drawings stamped "*Exceptions Noted*", and the three stamped "*Revise and Re-Submit*" I noted that they contained myriad notations by Chou concerning no piece marks, incorrect beam marks, incorrect beam and column sizes, a missing framing level, incorrect elevations, missing connections and missing plates.

Coggin's claim that Chou only noted minor exceptions to Dobslaw's shop drawings and that his comments were "*minimal*" is not supported by the facts. Of the fifty-nine (59) drawings, Chou rejected three (3) and had extensive comments and made substantial corrections to thirty-nine (39) others.

Coggin claims that Chou's comments were limited to a "*preference for connecting materials*" and not that connections were incorrectly detailed. A review of the Dobslaw drawings does not bear this out. Many details had missing connections altogether. For example, there was a missing bracket on Column 6B, Drawing No 6, missing holes for beam connection on Beam 16A on Drawing No 16 and missing anchors on Beam 43A on Drawing No 43. There was a connection on Drawing 20 which used an A307 bolt in lieu of A325 bolt as required by the General Notes. At some connections which were missing, Chou suggested a specific method for connection. Some corrections asked for architectural input for dimensions. A number of comments asked for the General Contractor (Reeves) to field verify dimensions. Any statement that Chou was satisfied with the production of this submission is not borne out by a review of these drawings. In my experience, these drawings are below the quality I have encountered on projects of similar size.

Coggin's claim that the failure to retain a Professional Engineer to design connections did not create extra work for Chou is unfounded. When there is no Professional Engineer's seal on shop drawings, the responsibility for the connections reverts to Chou. Chou had to look at all of the connections much more carefully, as their design adequacy became his responsibility. This is true whether or not there were any mark-ups.

Moreover, Coggin completely ignores the numerous RFIs generated by Architectural Steel requesting connection details which could have been readily addressed by a Professional Engineer. See my April 5, 2013 report, pp. 12 -13. Chou not only spent considerable time answering Architectural Steel's RFIs, he spent an entire day at Architectural Steel's office assisting them in the preparation of Architectural Steel's shop drawings. At least a portion of this extra work on the part of Chou and the resulting project delay could have been avoided had a Professional Engineer been retained.

Coggin takes issue with the notion that a P.E. retained by Architectural Steel would have reduced the number of RFIs by Architectural Steel. Referring to RFI Nos. 13, 40, 42, 44, Coggin takes the position that each of these RFIs requested information that was owed by Chou, not a Professional Engineer. I disagree.

I have discussed RFI No. 13 above.

Mr. Michael S. Soule, Esquire

October 16, 2013

E. Allen Reeves v. Michael Graves & Associates, et al.

O'Connor Kimball File # 991-0147 - AWL Project #: 2647

Page 5

RFI 40 raised a simple detailing issue as to a connection and in the reply Chou gives a couple of standard connection options. A Professional Engineer retained by the fabricator could have eliminated the need for this RFI.

RFI 42 requested connection details for tube steel hangers. This is precisely the type of RFI that would have been avoided had Architectural Steel hired a P.E.

Mr. Coggins refers to RFI 44. It requests a hanger detail for light ga. framing. There already are two typical hanger details on S1.2. Since the responsibility for the detailing rests with the light ga. framing engineer, this question should have been addressed by the engineer, not Chou.

C. New Opinions Raised by Coggin

Coggin claims on page 16 of his report that some seismic design criteria was missing from Chou's drawings and that the drawings therefore did not meet NJUCC code requirements. All basic seismic criteria are listed on Drawing S1.0. Moreover, the New Jersey DCA accepted the Chou drawings as code compliant. I note further that I have never been involved in a project where the basic seismic force was defined or where the calculated seismic base shear was indicated on the drawings. Finally, I am unaware of any claim made by Reeves, the Arts Council or their expert Navigant Consulting, Inc. that seismic design criteria was missing from Chou's structural design, or that the plaintiffs in this matter were damaged by this alleged omission. Accordingly, this is not an issue I addressed in my report of April 5, 2013. This is a new issue being raised by Mr. Coggin for the first time in this litigation.

Coggin claims on page 16 of his report that Chou provides no information on the connection of the structure to masonry walls to resist lateral forces. I disagree. The drawings are replete with these connection details. See, e.g. S4.1, S4.2, S5.1, S5.2, S5.3, S6.1, S6.2 and S6.3. Furthermore, I note that details of light gage framing saddles are indicated on S1.2. This provides the information a fabricator would need to design these connections.

Coggin claims that Chou failed to meet the 2000 IBC criteria on cantilevered diaphragms. The system selected by the Structural Engineer to resist lateral loads depends on the engineering judgment of the Engineer of Record. Mr. Coggin cannot make a judgment in this respect without a full understanding of what the Engineer of Record is counting on to meet this requirement. More importantly, this has nothing to do with the claims in this case and is in no way a rebuttal to any opinion I provided in my report of April 5, 2013.

Coggin repeatedly states how important the original construction drawings were for this project. As a general rule, original drawings are of great value when producing documents for renovations or additions. In this case, there were some difficulties:

- The drawings that were given to Chou were of very poor quality and extremely hard to decipher. For example, I could not tell if the hatching of the basement wall that turned

Mr. Michael S. Soule, Esquire

October 16, 2013

E. Allen Reeves v. Michael Graves & Associates, et al.

O'Connor Kimball File # 991-0147 - AWL Project #: 2647

Page 6

out to be bearing was of "*hard burned bearing brick*" or "*common brick*". Many notations were illegible.

- There was no note calling for a footing under that wall, which would indicate a bearing wall. One could assume that it was not a bearing wall because the footing at the pier looks and scales to be same as for the adjacent "*lally column*". As recognized by Reeves' superintendant, Randy LaCoste, one could not determine with any certainty that this was a bearing wall without invasive demolition.
- The fact that the orthogonal footing reinforcement was indicated on one footing did not add to any clarity or usefulness of the drawings.

Finally, in response to Coggin's allegation that Chou failed to specify the correct finished first floor elevation as shown on the existing drawings, the structural engineer does not set floor elevations. He follows the architectural drawings. Regardless, the contract documents clearly state that the contractor must field verify existing conditions and dimensions.

I have stated all of the opinions above to a reasonable degree of engineering certainty. Coggin's report has not affected my opinion stated in my original report that Chou met the professional standard of care. Should conflicting or additional data become available, I reserve the right to reanalyze all information and adjust my conclusions as appropriate.

Very truly yours,

A. W. LOOKUP CORPORATION

Putinas V. Mašalaitis, P.E.

Putinas V. Mašalaitis, P. E.

EXHIBIT

F

Testimony Resume

Past Expert Testimony (2007-2012)

Page 1

James M. McKay, P.E., AIA

Cutting Edge Construction, Inc. vs. DAL Design Group, PC et al
Superior Court of New Jersey, Civil Division, Hudson County
Docket No. HUD-L-1703-06 (Spring 2007)

Mr. McKay provided trial testimony as to the Standard of Care exhibited by the Architect on a project in Bayonne, New Jersey. Issues in the case included the evaluation and approval of Change Order Proposals, Payment Requests, and quality of documentation.

Contact: **Thomas D. Foti, Esquire**
Marshall, Dennehey, et al
425 Eagle Rock Avenue, Suite 302
Roseland, New Jersey 07068
(973) 618-4170

Oley Valley School District vs. Amthor Steel, Inc.

New Middle School Project

American Arbitration Association Case No.: 14-110-Y-01846-04 (Summer 2007)

Mr. McKay prepared a schedule analysis on behalf of the Oley Valley School District (OVSD) analyzing the events during the project focusing upon the impact of delays to the fabrication, delivery, and erection of the project structural steel by Amthor Steel, Inc. His analysis quantified the impact of Amthor's performance upon the overall project schedule and other prime contractors.

Contact: **Kevin K. Carton, Jr., Esquire**
Powell Trachtman Logan Carrle & Lombardo, P.C.
475 Allendale Road, Suite 200
King of Prussia, Pennsylvania 19406
(610) 354-9700

418 Duncan Avenue, LLC vs. Architecture Plus, PC et al

Superior Court of New Jersey, Civil Division, Somerset County

Docket No. SOM-L-148-04 (Fall 2007)

Mr. McKay provided hearing testimony as to the Standard of Care exhibited by the Project Architect in the design of an expansion to an existing commercial building in Somerset County New Jersey. Issues in the case involved the quality and completeness of the contract documents prepared by the Architect.

1-215-661-1551

Email: jmm4944@comcast.net



Testimony Resume (Cont'd)

James McKay

Past Expert Testimony (2007-2011)

Page No. 2

Contact: **Charles W. Miller III, Esquire**
Norris McLaughlin & Marcus, PA
PO Box 1018
Sommerville, NJ 08876
(908) 722-0700

Italine Construction, Inc. vs. Dormitory Authority of the State of New York
New York State Supreme Court, County of Albany
Index No. 4404-05 *(Summer 2008)*

Mr. McKay performed a schedule analysis on behalf of the Owner (DASNY) of contractor delay claims arising during the construction of an addition to a psychiatric hospital in upstate New York. He also evaluated various contractor claims for additional compensation associated with alleged defects in the contract documents. He testified at trial on behalf of DASNY on the schedule issues.

Contact: **Mauro Lapetina, Esq.**
Dormitory Authority - State Of New York
515 Broadway
Albany, New York 12207

Josh Elkes C/O Title and Closing Agency, Inc. and Edison & Masters, Inc.
vs. WML Architecture, P.A.,
American Arbitration Association Case No.: 18 421 Y 01721 06 *(Spring 2009)*

Mr. McKay prepared an analysis of the performance of the project architect in meeting the design objectives of the Owner for a commercial building in New Jersey. The main issue was the standard of care exercised by the architect in preparing the contract documents to achieve the Owner's stated design criteria. The report was used as a basis for portions of the Owner's claim against the architect in an arbitration case. He testified at the arbitration hearing to present and defend his analysis.

Contact: **Paul Sandars, III, Esq.**
Lum, Drasco & Positan LLC
103 Eisenhower Parkway
Roseland, NJ 07068-1049
(973) 403-9000



Testimony Resume (Cont'd)

James McKay

Past Expert Testimony (2007-2011)

Page No. 3

**Encorp International Inc. vs. US Army Corp of Engineers
Renovation of F-16 Depot Facilities, Helwan, Egypt
Contract No. DACA78-99-C-0021,
Armed Services Board of Contract Appeals #56412 (Summer 2009)**

Mr. McKay prepared a schedule analysis presenting the contractor's entitlement to extra time and costs arising from delays caused by the US Army Corps of Engineers on a project to modernize and expand the F-16 service facilities at an air base for the Egyptian Air Force in Helwan, Egypt. His analysis formed a portion of the contractor's presentation at a hearing before the Armed Services Board of Contract Appeals (ASBCA).

Contact: **A. Katherine Toomey, Esq.**
Baach Robinson & Lewis, PLLC
1201 F Street, NW
Suite 500
Washington, DC 20004
Phone: (202) 659-7216

**Red Rock Services Co., LLC (Robert H. Holber, Chapter 7 Trustee) vs.
Suffolk Construction Company, Inc.
McCormack Center Renovation Project
US Bankruptcy Court, Eastern District Of Pa. - Case No: 07-21572 (Fall 2010)**

On behalf of the Bankruptcy Trustee, Mr. McKay developed an analysis of claims for damages brought against the estate of Red Rock Services Company by the general contractor on a large renovation project in Boston. The analysis included an investigation of offset costs claimed by the contractor as well as verification of actual costs incurred by Red Rock. Mr. McKay gave both deposition and trial testimony.

Contact: **David R. King, Esq.**
Herrick, Feinstein LLP
210 Carnegie Center
Suite 102
Princeton, NJ 08540
(609) 452-3802

**Gruzen Sampton Architects v William Patterson University, et al
Superior Court of New Jersey, Civil Division, Passaic County
Docket No. PAS-L-2388-07 (Winter 2010)**

On behalf of the Project Architects, Mr. McKay developed and analysis of the Architect's claims for additional compensation and claims against the Architect for alleged defective design on a new Student Activity Center on the campus of William Patterson University in Wayne, New Jersey. The analysis included an investigation of the causes of project delay claimed by the

1-215-661-1551

Email: jmm4944@comcast.net



Testimony Resume (Cont'd)

James McKay

Past Expert Testimony (2007-2011)

Page No. 4

Contractor allegedly caused by design defects as well as verification of actual costs incurred by the Contractor. Mr. McKay prepared an expert report documenting his analysis and gave testimony at mediation/settlement meetings.

Contact: **Michael Suarez, Esq.**
 Suarez & Suarez
 2016 Kennedy Blvd.
 Jersey City, NJ 07305
 210-433-0778

Miller Global Properties, LLC, et al vs. Marriott International, Inc., et al
Hotel/Resort Development Project
Collin County, Texas, 219th Judicial District Cause No. 219-03327-2009 *(Winter 2011)*

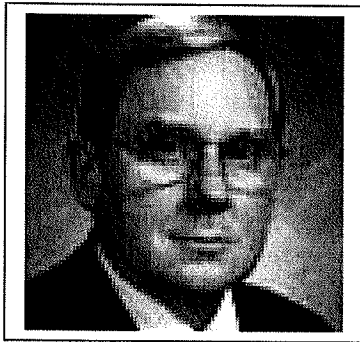
On behalf of Marriott International, Mr. McKay prepared an analysis of the performance of the parties during the course of the project's development. The primary issue was the standard of care required of a project manager during the course of project development. The report was used as a basis for portions of the Defendant's response to allegations of gross negligence and/or willful misconduct by Marriott during the course of the project's design and construction.

Contact: **Dennis Allen, CPA**
 Hill International, Inc.
 1225 Eye Street, NW
 Suite 601
 Washington, DC 20005
 (202) 408-3020



Curriculum Vitae

Construction Consulting and Litigation Support Worldwide



James M. McKay, P.E., AIA **Consulting Engineer and Architect**

Education

Rensselaer Polytechnic Institute, Troy, NY

- Master of Architecture, 1969
- Bachelor of Architecture, 1968
- Bachelor of Science, Building Science, 1966

Registrations

▪ **Professional Engineer:**

Pennsylvania (PE-027874-E)
Maryland (15322)
New Jersey (GE42689)
Delaware (12306)
Florida (59078)

Registered Architect:

Pennsylvania (RA-006961-X)
Illinois (001-015615)
Florida (AR94593)

Professional Affiliations

- American Institute of Architects (AIA), Member
- American Bar Association, Associate Member
- ABA Forum on the Construction Industry, Member

Employment History

Independent Consulting Practice (July 2004 – Present) *Independent Consultant*

Provided independent consulting services to clients in the building industry on scheduling issues, design errors and omissions, productivity disputes, damage quantification and dispute resolution. Assignments include both affirmative and defensive positions on disputes in a wide variety of industries and project types.

MDCSystems®, Berwyn, PA (1997-2004). *Executive Vice President*

Supervised the professional staff's analysis and defense, or preparation, of a variety of complex construction disputes. Mr. McKay is highly experienced in contract litigation and construction claims as both a technical consultant and expert witness. Accepted by several courts as an expert in construction scheduling, methods, procedures and disputes.

MDCSystems®/Day & Zimmermann, Inc., Phila., PA (1988-1997). *Project Manager.*

Performed as a team leader on a wide variety of construction related consulting assignments. Clients included major international developers, industrial manufacturing firms, several U.S. government agencies, design firms and contractors.

Capital Program Management, Inc., New York, NY (1986-1988). *Vice President.*

Served as a principal in this consulting firm with a national reputation as a leader in the development of architectural programs for correctional facilities. Expanded the firm's services to include construction litigation support.



Curriculum Vitae

James McKay, Page 2

Cleveland Wrecking Company, Sharon Hill, PA (1981-1985). *Project Manager.*

Provided both resident as well as home office project management on a wide variety of demolition and dismantlement (including asbestos and other hazardous material disposal) projects throughout North America. Estimated numerous projects for bid preparation. Supervised project activities from bidding to closeout. Project size ranged from \$25,000 to \$5 million.

Department of Public Property, City of Philadelphia, PA (1975-1981). *Assistant Director of Architecture and Engineering.* Supervised the operation of a 50-person design and construction department. The department was responsible, through its own staff and outside consultants, for the design and construction of a wide variety of municipal facilities. Annual volume included more than 500 contracts with an aggregate value of \$10-\$20 million.

Meridian Engineering, Philadelphia, PA (1973-1975). *Project Manager.*

Provided various support services to the City of Philadelphia as Coordinating Consultant on a proposed \$185 million center city rail tunnel project. Coordinated the work and progress of three primary design firms and their subconsultants on the project. Performed special studies for the City Director of Finance and Managing Director on construction packaging, phasing, double shifting, scheduling, etc.

Citicorp Realty Consultants, New York, NY (1971-1973). *Project Manager.*

Developed long-range client space need projections and architectural programs for client facilities (mostly commercial office space). Served as Owner's Representative on the construction of a new headquarters facility in New Hampshire.

James Kirkman & Associates, Albany, NY (1969-1971). *Project Manager.*

Developed computer-based project management systems for single projects and multi-facility programs. Developed computer-based construction program financing, scheduling and econometric models. Developed detailed computer-based construction schedules for contractors.

New York State University Construction Fund, Albany, NY (1967-1969). *Research Associate.* Directed the development of environmental (acoustics, lighting, handicapped access) performance criteria for university facility spaces. Developed long range planning and facility delivery procedures including capital budgeting development.



EXHIBIT

G



AAACE® International Recommended Practice No. 29R-03

FORENSIC SCHEDULE ANALYSIS

TCM Framework: 6.4 – Forensic Performance Assessment

Acknowledgments: (April 25, 2011 Revision)

Kenji P. Hoshino, CFCC PSP (Author)
John C. Livengood, CFCC PSP (Author)
Christopher W. Carson, PSP (Author)
Andrew Avalon, PE PSP
Michael S. Dennis, CCC
Rob Hartley, PSP
Richard J. Long, PE
J. Scott Lowe, PE
Robert B. McCullough, PE CCE CFCC
Donald F. McDonald, Jr., PE CCE PSP
Mark F. Nagata, PSP
Jeffery L. Ottesen, PE CFCC PSP
Thomas F. Peters, PE CFCC
Dr. Fredric L. Plotnick, PE
Dr. Anamaria I. Popescu, PE PSP
Mark C. Sanders, PE CCE PSP
L. Lee Schumacher, PE PSP
Michael D. Tarullo
Jeffrey M. Wentz
Ronald M. Winter, PSP
J. Kimon Yiasemides, PSP
James G. Zack, Jr., CFCC

Acknowledgments: (June 23, 2009 Revision)

Kenji P. Hoshino, CFCC PSP (Author)
Andrew Avalon, PE PSP
Christopher W. Carson, PSP
Michael S. Dennis, CCC
Sidney J. Hymes, CFCC
John C. Livengood, CFCC PSP
Richard J. Long
Mark F. Nagata, PSP

Jeffery L. Ottesen, PE CFCC PSP
Thomas F. Peters, PE CFCC
Dr. Anamaria I. Popescu, PE
Jose F. Ramirez, CCE
Mark C. Sanders, PE CCE PSP
L. Lee Schumacher, PSP
Stephen P. Warhoe, PE CCE CFCC
Ronald M. Winter, PSP
James G. Zack, Jr. CFCC

Acknowledgments: (June 25, 2007 Revision)

Kenji P. Hoshino, CFCC PSP (Author)
Robert B. Brown, PE
John J. Ciccarelli, PE CCE PSP
Gordon R. Costa, CFCC PSP
Michael S. Dennis, CCC
Edward E. Douglas, III CCC PSP
Philip J. Farrocco, PE
Sidney J. Hymes, CFCC
John C. Livengood, CFCC PSP
Mark F. Nagata, PSP
Jeffery L. Ottesen, PE CFCC PSP
Thomas F. Peters, PE CFCC
Keith Pickavance
Dr. Anamaria I. Popescu, PE
Jose F. Ramirez, CCE
Mark C. Sanders, PE CCE PSP
Takuzo Sato
L. Lee Schumacher, PSP
Robert Seals, PSP
Ronald M. Winter, PSP
James G. Zack, Jr. CFCC

1. ORGANIZATION AND SCOPE

1.1. Introduction

The purpose of the AACE® International Recommended Practice 29R-03 *Forensic Schedule Analysis* is to provide a unifying reference of basic technical principles and guidelines for the application of critical path method (CPM) scheduling in forensic schedule analysis. In providing this reference, the RP will foster competent schedule analysis and furnish the industry as whole with the necessary technical information to categorize and evaluate the varying forensic schedule analysis methods. The RP discusses certain methods of schedule delay analysis, irrespective of whether these methods have been deemed acceptable or unacceptable by courts or government boards in various countries around the globe.

This RP is not intended to establish a standard of practice, nor is it intended to be a prescriptive document applied without exception. Therefore, a departure from the recommended protocols should not be automatically treated as an error or a deficiency as long as such departure is based on a conscious and sound application of schedule analysis principles. As with any other recommended practice, the RP should be used in conjunction with professional judgment and knowledge of the subject matter. While the recommended protocols contained herein are intended to aid the practitioner in creating a competent work product it may, in some cases, require additional or fewer steps.

AACE recognizes that the method(s) of analysis to be utilized in a given situation, and the manner in which a particular methodology might be implemented, are dependent upon the contract, the facts, applicable law, availability and quality of contemporaneous project documentation, and other circumstances particular to a given situation. Therefore, the RP should be read in its entirety and fully understood before applying or using the information for any purpose. The reader should refrain from using the RP in a manner which is not consistent with its intended use, and not quote any of the contents in an out-of-context manner. As with any other recommended practice published by AACE, this RP is subject to future revisions as new methodologies are identified; new forensic scheduling software is developed; etc.

Forensic¹ scheduling analysis refers to the study and investigation of events using CPM or other recognized schedule calculation methods. It is recognized that such analyses may potentially be used in a legal proceeding. It is the study of how actual events interacted in the context of a complex model for the purpose of understanding the significance of a specific deviation or series of deviations from some baseline model and their role in determining the sequence of tasks within the complex network.

Forensic schedule analysis, like many other technical fields, is both a science and an art. As such, it relies upon professional judgment and expert opinion and usually requires many subjective decisions. One of the most important of these decisions is what technical approach should be used to measure or quantify delay and identify the effected activities in order to focus on causation. Equally important is how the analyst should apply the chosen method. The desired objective of this RP is to reduce the degree of subjectivity involved in the current state of the art. This is with the full awareness that there are certain types of subjectivity that cannot be minimized, let alone eliminated. Professional judgment and expert opinion ultimately rest on subjectivity, but that subjectivity must be based on diligent factual research and analyses whose procedures can be objectified.

For these reasons, the RP focuses on minimizing procedural subjectivity. It does this by defining terminology, identifying methodologies currently used by forensic scheduling analysts, classifying them, and setting forth recommended procedural protocols for the use of these techniques. By describing uniform procedures that increase the transparency of the analytical method and the analyst's thought

¹ The word 'forensic' is defined as: 1. Relating to, used in, or appropriate for courts of law or for public discussion or argumentation. 2. Of, relating to, or used in debate or argument; rhetorical. 3. Relating to the use of science or technology in the investigation and establishment of facts or evidence in a court of law: *a forensic laboratory*. [9]